# REESTABLISHMENT OF *STENOGONUM* NUTT. (POLYGONACEAE)[1]

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Abstract.— The genus *Stenogonum* Nutt. (Polygonaceae) is reestablished and distinguished from *Eriogonum* Michx. with which it has been synonymized since 1853. The genus, as outlined here, differs from *Eriogonum* in having two whorls of three foliaceous bracts surrounding the flowers instead of the normal, united tubular involucre. *Stenogonum* contains two species, *S. flexum* and *S. salsuginosum;* they are restricted primarily to the Colorado Plateau of Wyoming southward through eastern Utah and western Colorado to northwestern New Mexico and adjacent northern Arizona. Both species are illustrated and their respective ranges mapped.

In 1848, Thomas Nuttall, the famed English taxonomist and early western America explorer, published the last of his notes on North American plants. He had left Philadelphia in 1841 under the direction of the provisions of his inheritance, which directed him to return and reside in England for six months of each year; but he returned in the late fall of 1847 and remained in America until early spring of 1848, thereby being in England for the first six months of 1847 and the last six months of 1848. It was during this stay in Philadelphia that Nuttall wrote up various new species and genera which he had found on his 1834-1836 transcontinental trip with Nathaniel J. Wyeth. Some new plants were from a collection of plants made for him by a young friend, William Gambel. Among the specimens Nuttall collected on his trip was a low, spreading annual he named *Stenogonum salsuginosum* (Nuttall 1848a, b; Reveal & Spevak 1967). He found the specimens on the barren, gumbo-clay hills in late June of 1834 in what is now western Sweetwater County, Wyoming, at or near the site of the fur trappers' tenth rendezvous, which Wyeth attended in hopes of selling goods to the trappers.

The genus was short-lived. In 1853, Hooker reduced *Stenogonum* to *Eriogonum*, and this placement was soon quickly adopted by Bentham (1856) and subsequently followed by Torrey and Gray (1870), Watson (1877), Stokes (1936), and Reveal (1969a). Kuntze (1903) reduced *Stenogonum* to a section of *Eriogonum*, a move followed by Roberty and Vautier (1964), and the section was defined to include two species, *E. salsuginosum* (Nutt.) Hook. and *E. flexum* M. E. Jones (1891), by Reveal (1969a, b).

Nuttall established the genus on the basis of the unique involucral construction found in the type species *Stenogonum salsuginosum*. Unlike *Eriogonum*, which has a distinctly tubular involucral tube which is fused nearly the entire length of the involucre, the "involucres" of *Stenogonum* are composed of two whorls of three distinct foliaceous lobes arranged in such a way that the apex of the inner lobe is in between the apices of two of the three outer lobes. In the same paper, Nuttall proposed the genus *Oxytheca* which was based, in part, on the awned involucral feature. Subsequent to Nuttall's paper, a number of other genera were established which differ primarily in the involucral characteristics. As recently noted by Reveal and Howell (1976) in their paper which described a new genus related to *Eriogonum*, the involucre has been a major criterion for the establishment of genera in the subfamily Eriogonoideae Benth. (1837, 1856). Many genera even lack an involucre, while those with involucres can be characterized on this feature alone. Of all the genera, only *Stenogonum* has an "involucre" reduced to a two-whorled series, and none has typically six lobes even in a single whorl.

In the paper in which *Dedeckera* Reveal & Howell (1976) was described, *Eriogonum flexum* was transferred to *Stenogonum*. The purpose of this paper is

[1]This is the first of a series of proposed papers to review the genera of Polygonaceae subfamily Eriogonoideae other than *Eriogonum*.

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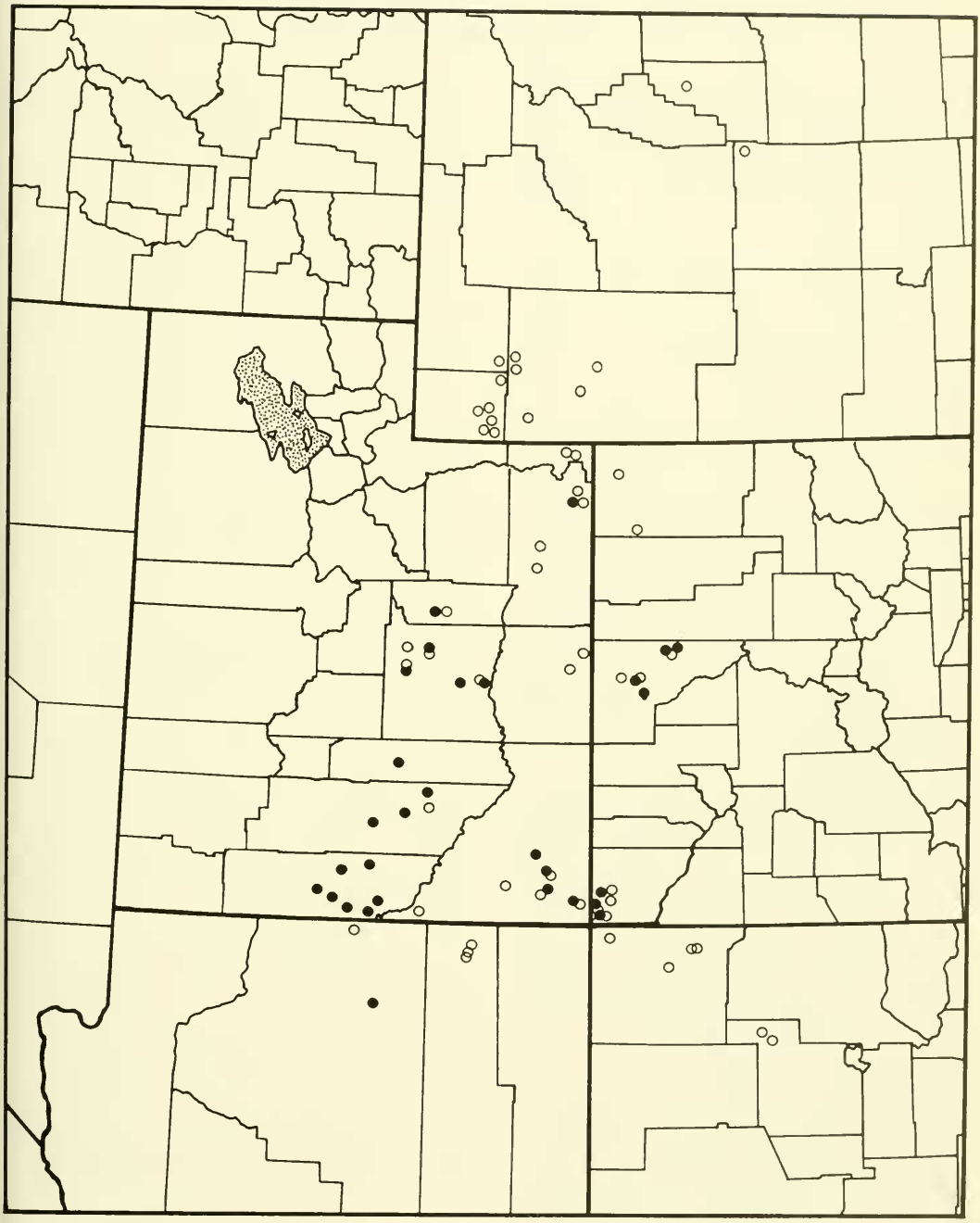

Fig. 1. Distribution map of the genus *Stenogonum* with the range of *S. flexum* (solid circles) and *S. salsuginosum* (open circles) indicated.

to characterize the genus and its two species.

## *Stenogonum* Nutt.

*Stenogonum* (*stenos* Gr., narrow, and *gonatos* Gr., knee, as to the narrow axis and branches) Nutt., Proc. Acad. Nat. Sci. Philadelphia 4: 19. 1848. — Typus: *S. salsuginosum* Nutt. — *Eriogonum* Michx. sect. *Stenogonum* (Nutt.) Kuntze in Post & Kuntze, Lexicon Gen. Phaenog. 204. 1903 — *Eriogonum* Michx. sect. *Stenogonum* (Nutt.) Roberty & Vautier, Boissiera 10: 92. 1964, nom. comb. superfl.

Low spreading to nearly prostrate or ascending to erect herbaceous annuals 0.5-3 dm high, 0.5-4 dm across, with numerous green, slender branches arising from a thin to slender woody taproot; *leaves* basal or basal and cauline, alternate, green and glabrous to sparsely and minutely strigose or glandular, the basal leaf-blades spathulate to orbicular, (0.5) 1-4 cm long, 0.5-2.5 cm wide, the margins entire and plane, the apex mostly rounded, the bases tapering to a more or less winged petiole or truncate to cordate and only slightly tapering, the petioles 0.5-4 cm long, the cauline leaf-blades linear-lanceolate to oblanceolate, 0.5-4.5 cm long, 0.2-1 cm wide, glabrous throughout in most—especially at maturity—gradually reduced above to small, nearly scalelike bracts at the uppermost nodes, sessile throughout; *flowering branches* spreading to erect or infrequently prostrate or decumbent, slender, 1-7 cm, glabrous or minutely glandular; *inflorescences* spreading to erect, open to diffuse, 0.5-2.5 dm long, di- or trichotomously branches at the first node, essentially dichotomously branched above, glabrous or slightly glandular at the lower nodes and glabrous above; *bracts* scalelike, ternate, triangular, 0.5-2 mm long, glabrous or sparsely glandular without, connate at the base; *peduncles*, when present, slender to capillary, 0.5-4 cm long, glabrous, erect, or nearly so, straight or flexed about 3/4 of the way up the structure to an acute angle; *involucral bracts* composed of two whorls of three lanceolate, foliaceous lobes, the outer whorl of lobes usually longer than the inner whorl of lobes and all alternately arranged, 2-8 mm long, 2-4 mm wide, glabrous on both surfaces, the bractlets lacking, or, if present, 0.3-0.5 mm long, sparsely pubescent, the pedicels slender, 0.3-1 or 2.5-3.5 mm long, glabrous; *flowers* yellow, 1.5-3 mm long, pilose without, glabrous within, the tepals monomorphic, lanceolate, united 1/3 to 1/2 the length of the flower; *stamens* slightly exserted, the filaments glabrous, the anthers yellow, 0.2-0.3 mm long, oval; *achenes* light brown, 1.5-3 mm long, glabrous, the globose base tapering to a long, 3-angled beak; $n=20$.

Distribution.— Dry clay hills mainly of the Colorado Plateau in the Green and Colorado river drainage basin from Washakie and Natrona counties, Wyoming, westward to western Sweetwater, Lincoln, and Uintah counties, Wyoming, south through eastern Utah and western Colorado into northwestern New Mexico and northern Arizona. Flowering from April to September.

The genus is composed of two species which differ in a number of gross morphological features, but they nonetheless share several characters in common, especially in the flower.

*Stenogonum* is clearly related to *Eriogonum*. The genus probably evolved from a basic expression near *E. inflatum* Torr. & Frem., the one species complex of *Eriogonum* subg. Ganysma (S. Wats.) Greene that is most likely the most primitive of the extant taxa of the subgenus. The two groups share somewhat similar flowers, floral pubescence, tepal shape, achenes size and shape, and, to a lesser degree, fairly similar types of stem and foliar pubescence. The similarities collapse with consideration of *S. salsuginosum* with its basal and cauline leaves, sessile or peduncled involucres, and the infrequent situation where the involucral bracts are entirely lacking, as will be seen at some of the lower nodes. It appears that *Stenogonum* evolved rather rapidly and distinctly from *Eriogonum*, retaining some of the basic features of the genus, but exploring new avenues, especially in the foliaceous, two-whorled involucral bracts.

The two species may be distinguished as follows:

A. Leaves strictly basal; peduncles 1-3 cm long, flexed; plants erect, sparsely glandular; eastern and southern Utah eastward to western Colorado

southward to the Four Corners area, and westward to Coconino Co., Arizona ..... 1. *S. flexum*

AA. Leaves basal and cauline; peduncles sessile to 4 cm long, straight; plants spreading, glabrous; central and southwestern Wyoming south to northwestern New Mexico and northeastern Arizona ..... 2 *S. salsuginosum*

### 1. *Stenogonum flexum* (M. E. Jones) Reveal & Howell

*Stenogonum flexum* (M. E. Jones) Reveal & Howell, Brittonia 28:24. 1976, based on *Eriogonum flexum* (*flexus* L., as to the bent or flexed peduncles) M. E. Jones, Zoe 2: 15. 1891. — On the Moencoppa, near Cameron, Coconino Co., Arizona, 10 Jun 1890, *M. E. Jones s.n.* Holotypus, POM! Isotypi, MO, US!

*Eriogonum flexum* M. E. Jones var. *ferronis* (Ferron, Emery Co., Utah) M. E. Jones, Contr. W. Bot. 11: 15. 1903. — 2 mi S Ferron, Emery Co., Utah, 18 Jun 1894, *M. E. Jones 5454.* Holotypus, POM! Isotypus, US!

Erect herbaceous annuals (0.5) 1-3 dm high arising from slender woody taproots; *leaves* basal, the leaf-blades orbicular to orbicular-rhombic, 0.5-2 cm long and wide, sparsely and minutely strigose when young, becoming glabrous at maturity, glandular in some, the margins entire and plane, the apices rounded, the bases truncate to cordate or slightly tapering, the petioles 1-4 cm long, sparsely strigose to glabrous; *flowering branches* erect, slender, 3-7 cm long, minutely glandular; *inflorescences* erect or slightly spreading, 0.5-2.5 dm long, trichotomous at the first node, dichotomous above, glandular at the nodes and lower parts of the internodes, glabrous above; *bracts* scalelike, ternate, triangular, 0.5-2 mm long, glabrous or sparsely glandular, connate at the base; *peduncles* filiform, 1-3 cm long, flexed to an acute angle about ¾ the length of the peduncle, glandular up to about the middle of the peduncle; *involucral bracts* 2-3 mm long, 2-4 mm wide, glabrous or sparsely glandular without, glabrous within, the two whorl of lobes composed of three foliaceous, lanceolate bractlike lobes each, the outer lobes wider and slightly shorter than the inner lobes, the bractlets lacking, or, if present, then few in number, 0.3-0.5 mm long, sparsely pubescent, the pedicels 2.5-3.5 mm long, glabrous; *flowers* yellow with greenish yellow midribs and bases, occasionally reddish yellow to reddish brown at the base, 1.5-2.5 mm long at anthesis, becoming 2.5-3 mm long in fruit, pilose with curved yellowish hairs without, glabrous within, the tepals essentially monomorphic, lanceolate, united about ⅓ to ½ the length of the flower; *stamens* slightly exserted, 1.5-2 mm long, the filaments glabrous, the anthers yellow, 0.2-0.3 mm long, oval; *achenes* light brown, 2-2.5 mm long, the globose base tapering to a 3-angled beak; $n = 20$ (Reveal 1967).

DISTRIBUTION.— Dry clay hills and flats in eastern Utah from Uintah Co. southward to Kane and San Juan cos., and in western Colorado in Mesa and Montezuma cos., and in Coconino Co., Arizona. Flowering from April to July.

REPRESENTATIVE SPECIMENS.— ARIZONA: Coconino Co.: Known only from the type. COLORADO: Unknown: Near Gunnison River, 1892-1893, *Purpus 185* (P). Mesa Co.: Gunnison Mesa near Grand Junction, 15 May 1916, *Eastwood 5203* (BM, CAS, DS, K); near Whitewater, 23 May 1947, *Harrington 2636* (CS); DeBeque, 22 Jun 1912, *Osterhout 4725* (COLO); 2 mi NE DeBeque, 14 Jun 1948, *Ripley & Barneby 9186* (CAS); Grand Junction, 16 Jun 1901, *Stokes s.n.* (NEB, RM). Montezuma Co.: McElmo Creek, 11 Jul 1895, *Eastwood s.n.* (CAN, UC); NE of Four Corners, 13 Jun 1949, *Weber 4811* (ARIZ, CAS, COLO, DS, KANS, TEX, UC, WTU). UTAH: Carbon Co.: E of Wellington, 12 Jun 1947, *Ripley & Barneby 8645* (CAS, NY). Emery Co.: 27 mi W Green River along the road to Castle Dale, 24 May 1961, *Cronquist 9100* (NY, TEX, UTC, WS, WTU); 3.5 mi S Ferron, 20 Jun 1965, *Holmgren et al. 1966* (ARIZ, BRY, CAS, COLO, CS, DAV, DS, GH, ISC, KSC, MO, NY, OKL, OSC, RM, RSA, TEX, UC, UNC, US, UTC, WTU). Garfield Co.: 20 mi SE Escalante, 26 Jun 1965, *Holmgren et al. 2045* (ARIZ, BRY, CAS, COLO, CS, DAV, DS, GH, ISC, KSC, MO, NY, OKL, OSC, RM, RSA, TEX, UC, UNC, US, UTC, WTU); E side of Mt. Ellen, 8 Jun 1932, *Stanton 1042* (BRY). Kane Co.: W side of Paria River above Paria, 20 May 1965, *Cronquist 10130* (BRY, COLO, DS, ILL, ISC, KANS, OSC, RM, TEX, UC, UNC, UTC); 42 mi E Kanab, 6 Jun 1942, *Ripley & Barneby 4845* (CAS, GH, NY). San Juan Co.: White Mesa between Blanding and Bluff, 19 Jun 1944, *Holmgren & Hansen 3394* (BRY, CAN, COLO, GH, IDS, MO, NY, UC, US, UTC, WS, WTU); Westwater Canyon, 5 mi S Blanding, 24 Jun 1932, *Maguire & Redd 17419* (UTC). Uintah Co.: N of Jensen, 8 Jun 1965, *Holmgren & Reveal 1853* (ARIZ, BRY, CAS, COLO, CS, DAV, DS, GH, ISC, MO, NY, OKL, OSC, RM, RSA, TEX, UC, UNC, US, UTC); 7 mi N Jensen, 3 Jun 1950, *Porter 5299* (CAS, DAO, DS, GH, NY, PH, RM, TEX, WTU). Wayne Co.: River Ford Road-Bentonite Hill Road, 3 mi NW junction with Utah Highway 24, Capitol Reef Natl. Park, 6 Jun 1973, *Harrison 949* (BRY).

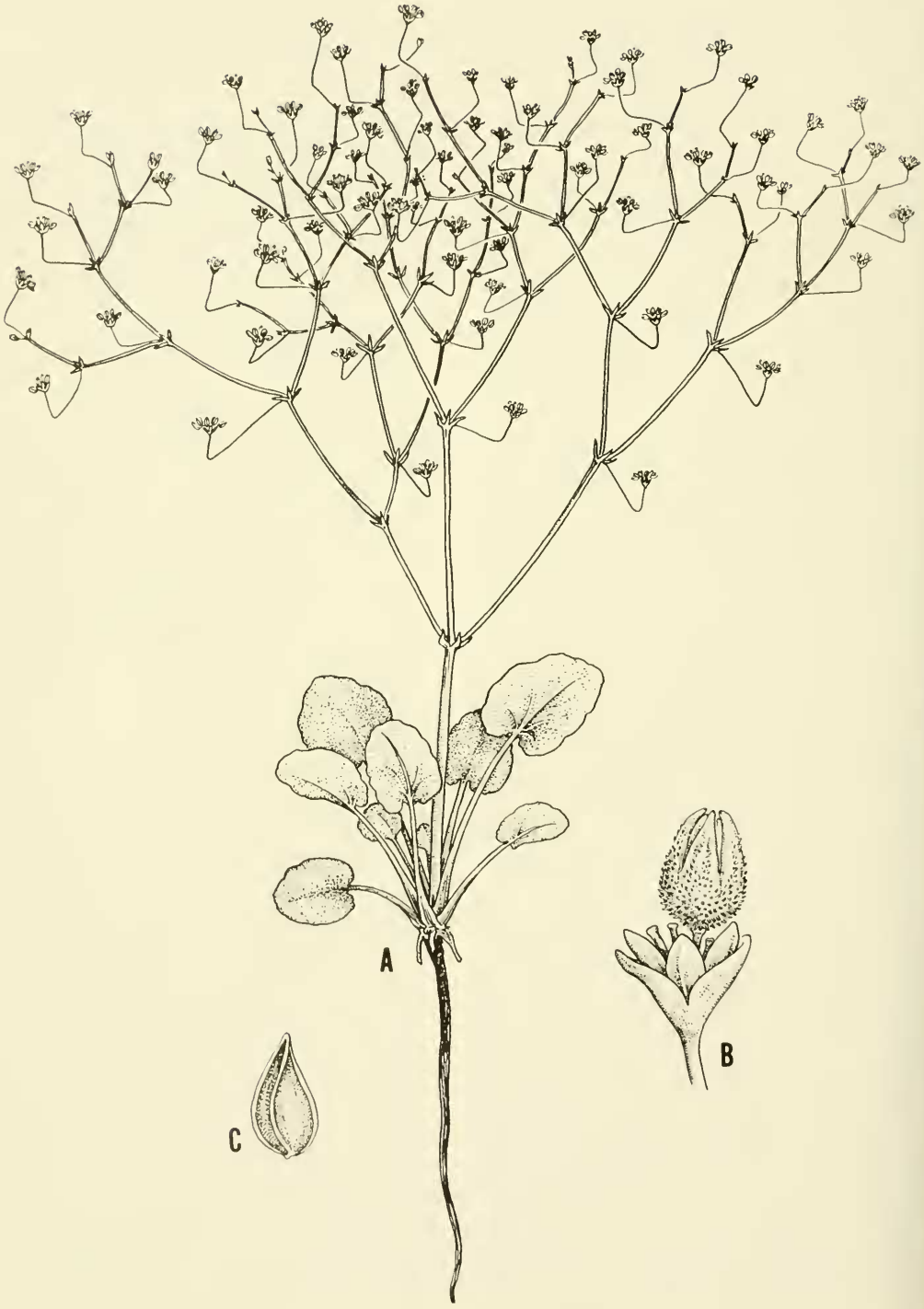


Fig. 2. Illustration of *Stenogonum flexum* showing the general habit of the species (A), involucral bracts and flowers (B), and an achene (C).

The type of *Stenogonum flexum* was collected by Marcus E. Jones along the Moencoppa (now spelled Moenkopi) Wash north of Cameron in Coconino Co., Arizona. This is the only Arizona record of the species, and the southernmost location of the species. The unique features of the species were misunderstood by Rydberg (1917), Tidestrom (1925), and Kearney and Peebles (1951), who placed the species in synonymy with *Eriogonum glandulosum* (Nutt.) Nutt. ex Benth. in DC. Howell (1956) resolved the error, and during this study raised a question in his own mind whether or not the genus *Stenogonum* ought not to be recognized and *E. flexum* placed in it. A similar question had occurred to George Goodman, but neither man formally presented their opinions in print. We are grateful to both for their comments on *Stenogonum* and its distinctiveness from *Eriogonum*—a point of view we did not share with them until convinced by Howell when the genus *Dedeckera* was published (Reveal & Howell 1976).

### 2. *Stenogonum salsuginosum* Nutt.

*Stenogonum salsuginosum* (*salsuginosus* ML., growing in places overflowed by salt or brackish water, alluding to the habitat) Nutt., Proc. Acad. Nat. Sci. Philadelphia 4: 19. 1848. — "Bare saline hills of the Colorado of the West, in the Rocky Mountains," probably near the Green River south of the junction of the Big Sandy River, 18-22 Jun 1834, *Nuttall s.n.* Holotypus, BM! Isotypi, GH, K! — *Eriogonum salsuginosum* (Nutt.) Hook., Hooker's J. Bot. Kew Gard. Misc. 5: 264. 1853.

Low, spreading suberect to erect herbaceous annuals 0.5-2 dm high, 0.5-4 dm across, arising from a slender, woody taproot; *leaves* basal and cauline, the basal leaf-blades spatulate, (1) 2-4 cm long, (0.5) 1-2.5 cm wide, glabrous and green on both surfaces, the margins entire and plane, the apices rounded, the bases tapering to a more or less winged petiole, the petioles short, glabrous, 0.5-2 cm long, the cauline leaf-blades linear-lanceolate to oblanceolate, 0.5-4.5 cm long, 2-10 mm wide, similar to the basal leaves only slightly narrower and sessile; *flowering branches* prostrate to decumbent or suberect to erect, slender, 1-3 cm long, glabrous; *inflorescences* open but slightly to rather densely diffuse, 0.5-2 (3) dm long, glabrous, dichotomously branched throughout; *bracts* highly reduced or lacking, mostly scalelike, connate at the base; *peduncles*, when present, slender to filiform, up to 4 cm long, erect and essentially straight, glabrous; *involucral bracts* 2-8 mm long, 2-3 mm wide, glabrous within and without, the two whorls of lobes composed of three foliaceous, lanceolate bractlike lobes each, the outer lobes much longer (by up to 5 mm) and narrower than the inner whorl, the inner whorl sometimes greatly reduced, rarely both whorls lacking, the bractlets lacking, the pedicels 0.3-1 mm long, glabrous; *flowers* yellow with greenish yellow midribs and bases, 1.5-2.5 mm long at anthesis, becoming 2.5-3 mm long in fruit, pilose with curved yellowish hairs without, glabrous within, the tepals essentially monomorphic, lanceolate, united about ⅓ to ½ the length of the flower; *stamens* slightly exserted, 1.5-2 mm long, the filaments glabrous, the anthers yellow, 0.2-0.3 mm long, oval; *achenes* light brown, 2-2.5 mm long, the globose base tapering to a 3-angled beak; $n = 20$ (Reveal, 1967).

DISTRIBUTION.— Dry clay hills and flats in Washakie and Natrona cos., Wyoming, westward to Sweetwater and Uinta cos., Wyoming, southward through eastern Utah from Daggett Co., south to San Juan Co., and in Moffatt, Mesa and Montezuma cos., Colorado; into San Juan and Sandoval cos., New Mexico, and westward into Mohave and Navajo cos., Arizona. Flowering from April to September.

REPRESENTATIVE SPECIMENS.— ARIZONA: Mohave Co.: Head of Olsen Canyon, 27 May 1969, *Atwood 1772* (BRY). Navajo Co.: Near Agathla, 14 Sep 1938, *Eastwood & Howell 6638* (CAS); Capitan, N Kayenta, 4 Jun 1935, *Peebles & Fulton 11916* (CAS). COLORADO: Mesa Co.: S Fruita on the S side Colorado River, 25 May 1964, *Weber 12109* (COLO); E edge DeBeque, 15 May 1965, *Weber & Murray 12352* (COLO). Moffatt Co.: Massadona, 7 Jun 1951, *Ripley & Barneby 10614* (CAS). Montezuma Co.: E Aneth, 19 Jun 1968, *Harrington 10112* (CS); N bank Mancos River, NE Four Corners, 12 Jun 1949, *Weber 4800* (CAS, COLO, CS, DAO, DS, IND, KANS, TAES, TEX). NEW MEXICO: Sandoval Co.: 10 mi W Cuba, 31 Jul 1939, *Goodding & Jensen 63-39* (ASU, US); W Cuba 27 May 1947, *Ripley & Barneby 8353* (CAS). San Juan Co.: Aztec, May 1899, *Baker 209*, (BM, E, K, G); E of Aztec, 1 Jun 1952, *Clark s.n.* (UNM); 10 mi N Shiprock along U.S. Highway 666, 26 Jul 1973, *Higgins 7944* (BRY, WTS). UTAH: Carbon Co.: 2.7 mi S U.S. Highway 50 on road to Mounds, 29 Apr 1968, *Atwood 1264* (BRY, ISC); Along dirt road 1.2 mi S U.S. Highway 50, this junction 5.5 mi E Wellington, 29 Jun 1975, *Reveal & Reveal 3835* (BRY, CAS, GH, MO, NY, OKL,


Fig. 3. Illustration of *Stenogonum salsuginosum* showing the general habit of the species (A), involucral bracts and flowers (B), and an achene (C).

TEX, US, UTC). Daggett Co.: On Vernal-Manila road near N boundary of Ashley Natl. Forest, 17 Jul 1929, *Hutchings 137* (OGDF); 1 mi N Manila, 12 Jul 1935, *Maguire 12371* (UTC). Emery Co.: 6 mi W U. S. Highway 50 on road to Huntington, 29 Apr 1968, *Atwood 1299* (BRY); 10 mi E Huntington, 30 Apr 1968, *Higgins & Reveal 1252* (BRY); Farnham, 29 Jun 1898, *M. E. Jones 6527* (BM, CAS, DS, POM, UTC). Garfield Co.: Henry Mts., 8 Jun 1932, *Stanton 1031* (BRY, UTC). Grand Co.: Cisco, 2 May 1890, *M. E. Jones s.n.* (G); 2.8 mi W Westwater, 3 Jun 1958, *Raven 13059* (CAS). San Juan Co.: McElmo Creek, May 1892, *Eastwood s.n.* (CAN, DS); White Mesa Dugway, 10 mi N Bluff, 15 May 1944, *Holmgren 3205* (UTC); Whirlwind Draw along Clay Hills Divide, 30 Apr 1966, *Reveal 718* (BRY, DS, KSC, UMO). Uintah Co.: Willow Creek, S Ouray, 11 Jun 1965, *Holmgren & Reveal 1906* (ARIZ, BRY, CAS, COLO, CS, DAO, DS, GH, ISC, KSC, MO, NY, OKL, RM, RSA, UC, UNC, US, UT, UTC); 7 mi N Jensen, 3 Jun 1950, *Porter 5295* (CAS, DAO, DS, RM); 10 mi S Ouray, 16 Jun 1937, *Rollins 1728* (DS, G, GH, UTC); Dinosaur Natl. Monument, 8 May 1950, *Weber 5330* (COLO, DNM); SW boundary of Dinosaur Natl. Monument, 3 Jul 1955, *Welsh 410* (BRY, UNC). WYOMING: Lincoln Co.: Banks of Ham's Fork, Aug. 1843, *Geyer 100* (BM, G, ISC, K). Natrona Co.: 0.5 mi E James Hendry ranch house, near Badwater, 5 Jul 1963, *Weber 43* (COLO). Sweetwater Co.: Granger, 7 Aug 1898, *Diehl s.n.* (BRY); 22 mi S Green River, 29 Jun 1951, *Porter & Rollins 5712* (DAO, DS, GH, RM); Between Opal and Granger, 19 Jun 1923, *Payson & Armstrong 3216* (COLO, ILL, ISC, RM); 25 mi NE McKinnon, 2.8 mi SE Wyoming Highway 530, 14 Jun 1971, *Reveal 2348* (BRY, GH, MO, NY, UC, US, UTC). Uinta Co.: 2 mi N Lone Tree, 14 Aug 1971, *Atwood 3086* (BRY); 6 mi from Mountainview on road to Lone Tree, 23 Jun 1953, *Holmgren & Tillett 9469* (CAS, DAV, NY, UTC); Ft. Bridger, Jul 1873, *Porter s.n.* (BM, NDG); 8 mi E Lyman, 19 Jun 1938, *Rollins 2379* (DS, GH, RM). Washakie Co.: W of Worland, 19 Jun 1962, *Nichols 144* (RM).

The type of *Stenogonum salsuginosum* was collected by Thomas Nuttall along the Green River in Sweetwater County, Wyoming, in late June of 1834. Nuttall was traveling with Nathaniel J. Wyeth and John K. Townsend, and at this time the party was at the tenth rendezvous of the fur trappers. The actual site of the rendezvous was moved several times. On 18 June, the company was near the mouth of the Big Sandy River, but by the 22nd, the rendezvous had been moved to a point some 12 miles up Ham's Fork. We believe that Nuttall likely found his specimens of this species while moving southward along the Green River and up the Black Fork to Ham's Fork.

This species is closely related to *S. flexum*, with the two differing mainly in vegetative features and the growth aspect of the mature plants. Both species will flower when the plants are barely two centimeters tall, and at this time, the two are extremely difficult to distinguish. For the most part, the inflorescenses of *S. salsuginosum* will have distinct leaves along the branches, whereas the inflorescences of *S. flexum* will be devoid of leaves.

A key to *Stenogonum* and the other genera of Eriogonoideae is given in the paper by Reveal and Howell (1976).

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